TEACHER EVENT CHECKLIST OUR SOLAR NEIGHBORHOOD EXPEDITION (Astronomy)

Date Completed	PRE EVENT REQUIREMENTS			
	Print out a copy of this entire file (color copy preferred). Please note: this document is 13 pages long.			
	Sign <u>Agreement to Participate</u> and E-mail to the Distance Learning Outpost within 3 business days of confirmation.			
	3. Have students take Pre-Event Quiz (activity #1) on page 6.			
	4. Complete all <u>pre-event activities</u> (activity #2-3) with the students on pages 8 to 11.			
	 Teacher to <u>E-mail</u> a minimum of 5 student questions to NASA no later than 3 business days prior to your event. 			
	6. Review NASA Event Guidelines with students on page 12.			
	DAY OF EVENT ACTIVITIES			
	The students will be asked to share their solar system models, planetary facts, & worksheets with the NASA host.			
	POST EVENT REQUIREMENTS			
	Have students take <u>Post-Event Quiz</u> to demonstrate knowledge of subject.			
	Teacher(s) and students to fill out event <u>feedback.</u>			
	Distance Learning Outpost will respond to any follow-up questions.			
	4. At Teacher's discretion, students can complete extended activities.			

Teacher Agreement To Participate NASA's Distance Learning Outpost

I have reviewed the Our Solar Neighborhood Astronomy Learning Module and agree to complete all of the required activities with my students, both prior to, and following, the video teleconferencing event.				
Teacher(s)				
School/Institution				
Event#				
Date of Event				

NASA's Distance Learning Outpost Our Solar Neighborhood (Grades K-8)

Instructional Goal:

Upon completion of this learning module, students will be able to describe the characteristics of the planets in our solar system, their size, the distances between them, and the paths that they travel.

Learning Objectives:

- Students will be able to discuss, for each planet in our solar system, the scale and size of each planet and its distance from the sun.
- Students will be able to describe the motion of the planets with respect to the sun and the properties of the planets' orbits.
- 3. Students will be able to provide physical characteristics of the planets.

National Education Standards

Science Standards (NSTA)

Science as Inquiry

Abilities necessary to do scientific inquiry Understandings about scientific inquiry

Physical Science

Properties of objects and materials

Life Science

Characteristics of organisms

Earth and Space Science

Objects in the sky

Science and Technology

Understandings about science and technology Abilities to distinguish between natural and objects made by humans

History and Nature of Science

Science as a human endeavor

Mathematics Standards

For the Solar System Scale Model activity, the mathematical themes are: problem solving, measurement, proportion, estimation, spatial relationships, representation of a real world situation with models (including the use of scale factors), using math in another subject (science), and critical thinking using mathematics.



Grade Level:

Grades K - 8

Estimated Time requirements:

Activity Set #1 50 minutes

• Activity Set #2 2 x 50 minutes

• Activity Set #3 50 minutes

• Video Teleconference 50 minutes

STUDENTS WILL BE ASKED TO SHARE THEIR SOLAR SYSTEM MODELS and INFORMATION DURING THE EVENT.

Texas Essential Knowledge and Skills (TEKS)

Science 2.1 A, B 2.2 A, B, C, D, E, F	<u>Math</u> 2.9 B, D 3.11 A
2.4 A	3.15 B
2.5 B	4.1 B
3.1 A, B	4.12 B
3.2 A, B, C, D, E, F	
3.3 A, B	
3.11 C, D	
4.1 A, B	
4.2 A, B, C, D, E, F	
4.3 E	
4 4 C	

OVERVIEW

Come take a trip through our solar neighborhood. Students will create their own model of the solar system while they learn about scale, orbits, and the physical characteristics of the planets.

INSTRUCTIONAL STRATEGY

Pre-Event Classroom Component

Class Activity # 1

1. Students take <u>Pre-Event Quiz</u> on page 6 to test their knowledge prior to these lessons about Astronomy. Students keep these quizzes on file to compare to their Post-Event Quiz.

Class Activity # 2

1. <u>Solar Model</u> on page 8. Have students work individually or in teams to build their scale model solar system. **Students will be asked to present their ideas, results, and models during the video teleconference**.

Class Activity # 3

- Planet Facts on page 10. Have students work individually or in teams to list interesting facts about each planet. Students will be asked to present their facts during the video teleconference.
- 2. Student Questions A Desire To Explore Further
 - Develop at least 5 questions from the class on astronomy
 - These questions should go beyond the basic information within the program
 - These questions should attempt to demonstrate "higher cognitive involvement" by the students
 - E-mail your questions at least 3 business days prior to your event with NASA
 - E-mail address is: DLO1@jsc.nasa.gov
- 3. Prepare the students for their participation in a live, interactive video teleconference with the NASA's Distance Learning Outpost.

Our Solar Neighborhood Terminology

The following is a list of words and definitions that your students need to be familiar with because the words are used throughout the activities and video teleconference. They will be asked to explain the meaning of these terms **in their own words** during the teleconference.

Astronomy - all the matter-energy in the universe: its distribution, composition, physical states,

movements, and evolution.

<u>Solar System</u> - the sun together with the group of celestial bodies that are held by its attraction

and revolve around it

<u>Mass</u> - the property of a body that is a measure of its inertia and that is commonly taken as a

measure of the amount of material it contains and causes it to have weight in a

gravitational field

<u>Diameter</u> - the length of a straight line through the center of an object

Orbit - a path described by one body in its revolution about another (as by the earth about the

sun or by an electron about an atomic nucleus)

Planet - any of the large bodies that revolve around the sun in the solar system

Classroom Activity #1 Our Solar Neighborhood Pre/Post Quiz

Name:	Class:	Date:
1) Astronomy is the study of:		
2) Name one of the early astronomers and what they contrib	uted to the study c	of astronomy.
3) Name the 9 planets in order from the Sun and list at least	two facts about ea	ach one. (Post Quiz – add
an interesting fact you learned during the program.)		
Planet #1 –		
Planet #2 –		
Planet #3 –		
Planet #4 –		
Planet #5 –		
Planet #6 –		
Planet #7 –		
Planet #8 –		
Planet #9 –		
4) Besides Earth, where would you explore to discover life in	our Solar System	, and why?

Our Solar Neighborhood Pre/Post Quiz

ANSWER KEY – Please do not share with your students. Answers should be similar to:

1) Astronomy is the study of:					
All the matter-energy in the universe: its distribution, composition, physical states, movements, and evolution.					
2) Name one of the early astronomers and what they contributed to the study of astronomy.					
There are many correct answers to this question.					
3) Name the 9 planets in order from the Sun and list at least two facts about each one. (Post Quiz – add					
an interesting fact you learned during the program.)					
Planet #1 – Mercury					
Planet #2 – Venus					
Planet #3 – Earth					
Planet #4 – Mars					
Planet #5 – Jupiter There are several possible facts for each planet.					
Planet #6 – Saturn					
Planet #7 – Uranus					
Planet #8 – Neptune					
Planet #9 – Pluto					
4) Besides Earth, where would you explore to discover life in our Solar System, and why?					
Mars because it appears that it may have resembled Earth in many ways long ago, and therefore could have been able to sustain life.					

Classroom Activity #2

Grades K-8

SCALE MODEL SOLAR SYSTEM

Build a Solar System

Materials

- Paper, Styrofoam balls, or any other material of your choice to make the nine planets and the sun
- 1 tape measure
- 1 compass to draw planets if using paper
- 1 pair of scissors
- 1 calculator
- 1 ruler
- Paint, crayons, or markers to color planets and sun models, if desired
- 1 long hallway or outdoor space of at least 110 feet (30.5 meters). You can make a partial model if your space is smaller.
- Pen or pencil
- Solar System Planetary Data Worksheet
- Computer with Internet access

Procedure

1. Developing a sense of the planets' sizes and their distances from the sun.

Grades K - 2 Activity

http://cosmos.colorado.edu/~urquhart/Scale/solar systemt k.html

Students will be introduced to each of the nine planets, and concepts of relative size and distance in the solar system. A chart of real and scaled distances of the planets is included.

Grades 4 – 8 Activity

http://cosmos.colorado.edu/~urquhart/Scale/solar systemt.html

Students will create their own scale model solar systems from common materials for the purpose of exploring concepts of size and distance in the solar system. The activity is broken into 2 sections; each will take approximately 45 minutes to 1 hour to complete, including short introductions and follow-ups. Groups of two students work well for this activity in the 9-12 year old age range (grades 4-6), especially for Part 2.

2. You may choose to use any of the following web sites.

Grade 4-8 Solar System - Scale Calculator

http://www.exploratorium.edu/ronh/solar system/index.html

Just place the size of the Sun you want to start with and all the planet's sizes and distances are automatically calculated to scale. You can also look at another column to see the diameters of the orbits based on your selected Sun size...a neat tool to work scale and distance!

Grade 4-6 The School Yard Solar System

http://nssdc.gsfc.nasa.gov/planetary/education/schoolyard_ss/

You can determine the sizes and distances from the sun for each planet

Grade 6-8 Automatic Solar System Scale Converter

http://www.exploratorium.edu/ronh/solar_system/

All Grades General Solar System Information

http://pauldunn.dynip.com/solarsystem/Main A.html

- 3. With the data that you have collected, fill in the table on the <u>Solar System Planetary Data</u> <u>Worksheet</u> on page 9 with the planets' diameters and distances from the sun. Remember to include units.
- 4. Determine and record the scale that you will use to:
 - a. Create the planet models' sizes.
 - b. Place the planet models at the correct distance from the sun model
 - c. Remember to include units when you record the scales.
- 5. Draw or build the planet models to scale.
- 6. Place the planet models at the correct modeled distances from the sun.
- 7. Take a picture of your model to show when you present your solar system data.

Student Presentation

Students will be asked to demonstrate their solar system models & worksheets during the video teleconference.

Classroom Activity #3

Grades K-8

PLANET FACT SEARCH

Materials

- Computer with internet access
- Text and reference books
- Pen or pencil
- Paper

Grade K-3 Procedure

- 1. Have students visit this web site: A Learning Center for Young Astronomers: http://starchild.gsfc.nasa.gov/docs/StarChild/ and list interesting facts about each planet.
 - a. Go to 'Level 1' then go to 'Planets.' There are many good facts and questions for the students to research.
- 2. Depending on the learning abilities, explore other levels and locations within this site.

Grade 4-8 Procedure

 Have students visit this web site: Planets Alive, Our Solar System: http://pauldunn.dynip.com/solarsystem/Main_A.html and select several physical characteristics about each planet.

Student Presentation

Students will be asked to present planetary facts to NASA during the video teleconference.

Solar System - Planetary Data Worksheet

Planet Scale Used:							
Distance from the Sun Scale Used:							
Planet	Actual Planet Diameter	Scaled Planet Diameter	Actual Distance from the Sun	Scaled Distance from the Sun			
Mercury							
Venus							
Earth							
Mars							
Jupiter							
Saturn							
Uranus							
Neptune							
Pluto							
Discussion o	juestions:						
1. Why did you have to use different scales for the sizes and distances of the planets from the sun?							
2. How do the planet sizes and the distances between the planets vary?							
3. a. Which scale was greater (circle)? Planet Scale Distance from Sun Scale							
b. What does that tell you about our solar system and what it consists of?							
4. What do you think is between the planets? Explain in some detail. How do you know?							

5. Why do you think it is important to include the **units** in the table that you created?

NASA Event Guidelines

Review the following points with your students prior to the video teleconference event:

- 1. A video teleconference is a two-way event. Students and NASA presenters can see and hear one another.
- 2. Students are representing their school; they should be on their best behavior.
- 3. Students should be prepared to give brief presentations, ask questions and respond to the NASA presenters.
- 4. A Teacher(s) or other site facilitator should moderate students' questions and answers.
- 5. Students should speak into the microphone in a loud, clear voice.

Get Ready, Be Ready, and have fun with your Distance Learning Event with NASA!

Post Event Teacher – Student Evaluation

- 1. **We need your help and support!** Choose the appropriate Form below. It usually takes teachers and students **less than 10 minutes** to complete. We welcome any input that you have at the following sites:
 - Teacher Feedback Form:

https://ehb2.gsfc.nasa.gov/edcats/centers/distance_learning.html

• Student K-3 Feedback Form:

https://ehb2.gsfc.nasa.gov/edcats/centers/jsc grades K3 stud fdbk.html

Student 4-12 Feedback Form:

https://ehb2.gsfc.nasa.gov/edcats/centers/dlo 412 student.html

Technical Contact Feedback Form:

https://ehb2.gsfc.nasa.gov/edcats/centers/jsc_dlo_tech_contact.html

Parent/Chaperone Feedback Form:

https://ehb2.gsfc.nasa.gov/edcats/centers/distance learning parent.html

- 2. Students and Teachers are **welcome to e-mail the Distance Learning Outpost** with any follow-up questions from the event at: mailto:DLO1@jsc.nasa.gov
- 3. **Please send** us any photos, video, web page link, newspapers articles, etc. of your event. We will be glad to post them on our web page!

Extended Activities for Our Solar Neighborhood

1. For further research on the Internet visit:

http://spacelink.nasa.gov/Instructional.Materials/Curriculum.Support/Space.Science/.

- 2. Find our your weight and age on the planets.
 - a. Students can visit this web site to fill in their weight and age and the answer is given to them automatically: http://kids.msfc.nasa.gov/Puzzles/Age.asp.
 - i. Students use their math skills to calculate their age and weight on other planets at http://www.factmonster.com/ipka/A0875450.html AND/OR
 http://vathena.arc.nasa.gov/curric/space/planets/agewt.html
- 3. More Astronomy Activities
 - K-6 Students can visit the Star Child website for more activities: http://starchild.gsfc.nasa.gov/docs/StarChild/.
 - b. The Space Place web site with Astronomy Activities and Information: http://spaceplace.jpl.nasa.gov/index.shtml
 - c. Cosmic Kids study Hubble Space Telescope: http://sm3a.gsfc.nasa.gov/classrm.html
 - d. Ask an Astronomer your questions at http://image.gsfc.nasa.gov/poetry/ask/askmag.html.